**Remarks**

Affirmation of the election of Invention I, claims 1-13 and withdrawal of Invention II, claims 14-30 and Invention III, claims 31-42 is affirmed.

Claims 1-13 and 43-47 are currently pending. Claims 14-42 have been withdrawn. Claims 43-47 have been added and read on Invention I.

Claim1 has been amended to clarify that the method applies to "spinning" projectiles and uses the physics of rotating projectiles to create the body lift (p. 8, lines 4-10). It is the action of intermittently deploying and stowing the aerodynamic surface on the spinning projectile that produces the desired rotational moment that reacts with the spinning projectile to create body lift. This is not equivalent to proportionally controlling the deployment of the surface to create drag for some period of time until a desired maneuver is performed and than stowing the surface, and than repeating for subsequent maneuvers (p. 8, lines 11-31 and p. 9, l. 5-6). The act of intermittently stowing the surface contributes to the formation of the desired rotational moment, which in turn moves the spinning projectile to the desired ballistic trajectory.

New claims 45-47 more particularly address the patentable features of the invention. Claim 45 claims "deploying and stowing at least one aerodynamic surface on the spinning projectile over multiple partial roll cycles". Claim 46 specifies that the surface is deployed at precise on positions and stowed at precise off positions. (p. 9, l. 6-8) Claim 47 species that the surface is only deployed within a single quadrant of each of the multiple roll cycles (p. 9, l. 3).

The cited art does not exploit the physics of rotating bodies to create body lift. Instead they deploy and control surfaces to create aerodynamic drag to maneuver the vehicle. These control systems can be used with either spinning vehicles or "roll controlled" vehicles (e.g., controlled not to rotate or spin). These systems are typically designed for "roll controlled" vehicles and derive no performance benefit from the rotation of the vehicle. Instead the cited art uses classic 'proportional control' to continuously adjust the aerodynamic surface until the desired maneuver is achieved. The surface is only stowed once the maneuver is completed. The method described in claim 1 "intermittently deploys and stows ..." to create the rotational moment and the "spinning

projectile reacts to rotational moment to...". The method described in claim 1 controls the surface to exploit the physics of the rotating projectile in a patentably novel manner that will not function in a "roll controlled", i.e. non-spinning, vehicle or projectile.

**Claim Rejections – 35 USC § 102**

Claims 1, 7, 8, 10-12 were rejected under 35 U.S.C. 102(b) as being anticipated by Teter et al (US 6502785). The Examiner states that Teter discloses "intermittently deploying and stowing (col. 3, lines 43-45) ... to develop a rotational moment (col. 4 lines 31-45 and col. 4 lines 11-22)". Teter is very similar to early guided missile systems that use proportional deployment of "blades" to maneuver roll controlled missiles except that Teter extends these principles to "flaps". Teter uses a three axis flap control system to provide "pitch, yaw, and roll control". "By engaging various pairs of the flaps, any desired vehicle orientation may be achieved." "The flaps may be engaged to any desired angle of engagement, from none to the maximum possible." (Col 2, lines 35-55). This is standard proportional control. The deployment of the flaps produce aerodynamic force vectors that when summed produce a desired force vector to orient the vehicle. Teter never discusses and does not rely on the reaction of a spinning vehicle to an induced rotational moment to produce body lift to reorient the vehicle. The physics and thus control methodology are different.

**Claim Rejections – 35 USC § 103**

Claims 1-3 and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Teter and further in view of Hakenesch (US 6283407). The Examiner stated that Hakenesch teaches the control of an aerodynamic vehicle by deploying and retracting a control surface over a partial roll cycle and repeating the step as necessary to achieve the desired control of the vehicle (col 2, lines 47-63, which detail how the "strake" is positioned at varying angles depending on its rotational position). Hakenesch describes a system for augmenting life. As shown in Fig. 3, as the angle of attack increases the lift provided by the rudder decreases to zero whereas the lift provided by the nose strake increases. The "strakes **5, 6** are continuously brought into a swing-out position **9** which changes continuously, among other things, according to the flight condition." (co. 3, l 45-

47) This is classic proportional control. The strake is deployed for so long as lift augmentation is required, which, if used in conjunction with a spinning missile, would last for multiple roll cycles. It would make no sense to intermittently deploy and stow the strake as this would remove the desired lift augmentation for a portion of each cycle rather than providing continuous lift augmentation for as long as is required by the angle of attack of the missile. Furthermore, the method of control uses classic aerodynamic control and does not exploit the reaction of a spinning vehicle to the rotational moment created by the intermittent deployment and stowing of an aerodynamic surface.

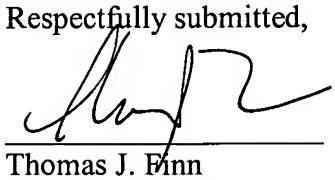
Claims 1 and 4-12 were rejected under 35 U.S.C. 103(a) as being unpatentable over Leek (US 4113204) Teter. The Examiner states the Leek intermittently deploys or stows at least one aerodynamic surface to develop a rotational moment (col 2, l 45-48) which creates body lift ..." Leek uses the same proportional control techniques (col 3, line 62-64, col 4, l. 51-53) as described previously and describes his novel control surface actuator in a "roll controlled" system that clearly does not exploit the physics of spinning projectiles to produce the body lift. In fact, a benefit of Leek's approach is that "by moving a pair of control surfaces in opposite directions, a yaw or pitch moment can be achieved without inducing roll". (Col 2, line 51-53).

**Conclusion**

It is respectfully urged that the subject application is patentable over the cited references and is now in condition for allowance.

The Examiner is invited to call the undersigned at the below listed telephone number if, in the opinion of the Examiner, such a telephone conference would expedite or aid the prosecution and examination of this application.

Respectfully submitted,



Thomas J. Finn
Reg. No. 48,066
520 749-8611 Phone
ATTORNEY FOR APPLICANTS

Date: ~~May 23~~, 2006
July 7